WHAT IS CLAIMED IS:

[c1]   1. A method for determining a location of an object within an area of interest, comprising:

transmitting an RF signal from the object to at least three receivers;

transmitting a signal from at least one beacon transmitter to the at least three receivers, said at least one beacon transmitter being at a known location;

calculating, at each of the at least three receivers, time difference of arrival information based on the signal from said at least one beacon transmitter and the RF signal transmitted from the object; and

determining a location of the object within said area of interest based on said time difference of arrival information.

[c2]   2. The method of claim 1, wherein said RF signal comprises a UWB signal.

[c3]   3. The method of claim 2, wherein said UWB signal comprises a TR-UWB signal.

[c4]   4. The method of claim 1 wherein the step of determining a location of the object comprises using a maximum likelihood algorithm.

[c5]   5. The method of claim 1, further comprising:

transmitting signals from a plurality of beacon transmitters to the at least three receivers, said plurality of beacon transmitters each being at a known location, each of the beacon transmitters having an independent local clock;

calculating, at each of the at least three receivers, a plurality of time difference of arrival data based on respective signals from said plurality of beacon transmitters and the RF signal transmitted from the object; and

determining the location of the object within said area of interest based on said time difference of arrival data from said at least three receivers.

[c6]   6. The method of claim 5 wherein the step of determining the location of the object comprises using a maximum likelihood algorithm.

[c7]   7. The method of claim 2, wherein said UWB signal comprises a TR/DH UWB signal; and wherein the step of transmitting a TR/DH UWB signal comprises generating pairs of pulses separated by a time interval D and encoding by relative polarity of pulses of said pairs; and wherein the step of calculating time difference of arrival information comprisies delaying received signals by the time interval D.

[c8]   8. The method of claim 7 wherein the step of transmitting further comprises generating the pairs of pulses at a pulse repetition rate which is variable in order to shape a spectrum of transmission.

[c9]   9. The method of claim 7 wherein TR/DH UWB signals are transmitted from a plurality of objects, each TR/DH UWB signal having a different time interval D between pulses of said pairs.

[c10]   10. The method of claim 2, wherein the step of transmitting the UWB signal is performed by a transmitter carried by a patient, and wherein said area of interest is a medical facility.

[c11]   11. The method of claim 9, wherein the step of transmitting the UWB signal further includes transmitting medical information of said patient with the UWB signal.

[c12]   12. The method of claim 2, wherein the step of transmitting the UWB signal is performed by a transmitter attached to medical equipment, and wherein said area of interest is a medical facility.

[c13]   13. A system for determining a location of an object within an area of interest, comprising:

a mobile device carried by said object, said mobile device including a transmitter for transmitting an RF signal;

at least one beacon transmitter at a known location for transmitting a beacon signal;

at least three base stations within said area of interest, each of said at least three base stations comprising a detector for detecting the RF signal transmitted from said mobile device, and further comprising a processor for deriving time difference of arrival information based on the beacon signal and the RF signal; and

a controller for determining the location of the object within said area of interest based on the time difference of arrival information calculated by each of the three base stations.

[c14]   14. The system of claim 13, wherein the RF signal comrpises a UWB signal.

[c15]   15. The system of claim 14, wherein the UWB signal comprises a TR-UWB signal.

[c16]   16. The system of claim 13, wherein said UWB signal comprises a TR/DH UWB signal, and said detector comprises a pulse-pair correlator.

[c17]   17. The system of claim 16 wherein said transmitter transmits said TR/DH UWB signal having a variable pulse repetition time.

[c18]   18. The system of claim 13 wherein

a plurality of mobile devices transmit RF signals to the at least three base stations, each of the three base stations comprising a plurality of detectors for detecting the RF signals and deriving time difference of arrival information based on the beacon signal and the RF signals, said controller determining locations of said objects based on said time difference of arrival information.

[c19] 19. The system of claim 13, wherein said object is a patient and said area of interest is a medical facility.

[c20] 20. The system of claim 13, wherein the transmitter of the mobile device transmits medical information of said patient with the RF signal.

[c21] 21. The system of claim 13, wherein said object is medical equipment and said area of interest is a medical facility.